AHRTAG BRIEFING PAPER

Practical guidelines for preventing infections transmitted by blood or air in health-care settings

03

Acknowledgements

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Practical guidelines for preventing injections transmitted by blood or air in health care settings

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Introduction

This briefing paper discusses the risks of blood-borne and airborne infections to both carers and patients. The focus is on how to prevent transmission of hepatitis, human immunodeficiency virus (HIV) and tuberculosis, for those working in resource-constrained situations. Learning more about strategies for preventing these infections will also help to prevent the transmission of other infections. The paper also highlights issues for those concerned with occupational-health training needs of health workers, and with policy formulation.

1 Infection risks in health-care settings

People who nurse, treat and comfort patients, friends or relatives who have infectious diseases have always faced some risk to themselves. Usually this risk is extremely small and is readily overcome by simple precautions. This is the case for those with viral hepatitis and tuberculosis. It is just as true for those caring for people with human immunodeficiency virus (HIV), whether or not they have AIDS.

It is important to remember that people receiving care also face some risk of infection, either from care-providers or from other patients. Infection control is a strategy intended to benefit both carers and those receiving care.

Hepatitis transmission

It is important to note that hepatitis A (and hepatitis E) are transmitted differently than hepatitis B (and hepatitis C and D).

Hepatitis B can be passed from one person to another through infected blood or body fluids (for example during medical care, or through sexual intercourse). Therefore, hepatitis B is the form of hepatitis considered most in this briefing paper. However, like other blood-borne or sexually transmitted infections, hepatitis B cannot easily be caught by normal social contact or by caring for someone with the disease. Home carers need not worry about catching hepatitis B therefore, as long as they follow the usual precautions outlined in this briefing paper.

Hepatitis A is transmitted through the faecal-oral route. This means that it is possible to spread hepatitis A through sharing cups or spoons, food preparation, shaking hands, and other normal social contact, as well as through handling faeces or other wastes. Every day use of very high standards of hygiene, and adequate supplies of clean water and soap, are needed to prevent transmission of hepatitis A.

A woman provides care and affection for her husband who is ill with AIDS in a Tanzanian hospital. L Gubb/WHO

1.1 Home care

Much of the care provided for people with AIDS and other conditions occurs at home, especially since some illnesses can last months or even years. There is no risk of acquiring HIV or hepatitis B from people infected with these viruses being cared for at home, provided certain basic rules are followed (see Section 2.2). Hepatitis B, HIV, and other sexually transmitted diseases are not spread during normal social contact, so home carers need not worry.

However, common infections such as diarrhoea and respiratory infections can be spread through normal social contact. The best way to prevent these from spreading from person to person is to wash hands frequently with soap and water and then dry them well. Good hygiene (cleanliness) in the home – or any health-care setting – is an important part of protecting against diseases (see boxes on this page and opposite).

1.2 Occupational infection risks

An occupational risk is when a person's work or occupation may expose them to an infection. The aim of infection control in this context is to prevent infection from passing from the patient to the carer or to other workers (such as cleaners) in the health-care setting. This means that the occupational risk to workers is reduced to a minimum.

Most work in the health-care setting involves no infection risk at all. Caring does not usually involve contact with infected patients' body fluids, although there is always a possibility of this, and therefore always a possibility of infection to the carer. However, this possibility is very low if proper caution is exercised.

Good hygiene

Always wash your hands before:

- cooking
- eating
- feeding another person
- giving medicine
- changing soiled bedding.

Always wash your hands after:

- using a toilet or changing nappies.

Other precautions that ensure good hygiene:

- Use clean water whenever possible and boil drinking water, especially for young children.
- Wash bedlinen, towels and clothes with soap and water.
- Store food properly to prevent it spoiling and causing sickness.
- When someone in the family is sick, wash drinking cups before sharing them.
- Cover your mouth when coughing or sneezing.
- Avoid spitting, or always spit into a container.
- Kiss babies on the tops of their heads rather than on their lips.
- Wash eating utensils, including those for babies, with soap and water.
- Wash all raw fruits and vegetables with clean water.
- Dispose of waste properly (so that no one will touch it accidentally), for example by using a pit latrine, or by burning or burying soiled objects.
- Put dirty things like nappies, used tissues, handkerchiefs and other soiled objects out of the reach of children until they can be removed from the home. Put them in a container that is hard to open until they can be cleaned or disposed of properly.

Source: *AIDS home care handbook*, WHO-GPA, 1993.

The risk of exposure is greatest in emergencies, when patients are distressed or unco-operative, when workers are hurried, stressed, overworked or tired, and in resource-poor settings. Factors that increase risks in resource-poor settings include inadequate lighting and other working conditions, few gloves or none at all, no chemical disinfectants or only washing powder to use, and cleaning and re-using needles.

There is some risk when workers handle body fluids or items soiled with or containing body fluids. There is also some risk where health work involves taking blood or tissue samples, dressing wounds or ulcers, cutting, suturing, giving injections and assisting childbirth. This risk is easily controlled in most circumstances.

There is a very low risk of infection transmission when unprotected skin is in contact with infectious body fluids. It is greatest when the skin is broken or damaged and when mucous membranes are in contact with infective body fluid. The degree of transmission risk across undamaged mucous membranes is not known but is thought to be higher than that across intact skin.

If accidents do occur, they are least dangerous when normally non-infective body fluids contact unbroken skin. The greatest danger is when infectious patient blood or blood-contaminated body fluid enters the worker's body.

Remember: the infection risks involved in most routine health-care work and other work in the health-care setting such as laundry, cleaning, and waste disposal are minimised if proper safety guidelines are followed. Indeed, exposure to body fluids is common in only a few types of health work, and most of the time, carers have unbroken skin.

Accidents which have led to occupational HIV infections have been reported in some countries. However, it is difficult to measure whether this is due to occupational risk or because the health worker is engaging in high-risk behaviours (see Section 1.4).

1.3 Main infections and infectious body fluids

HIV

Human immunodeficiency virus (HIV), the virus which causes AIDS, infects cells in human blood and lymph fluid, in the central nervous system and elsewhere in the body. The most usual way in which HIV passes from one person to another is during penetrative sexual intercourse. However, accidents and exposure to patients' infectious body fluids during health-care procedures can also permit transmission. Occupational safety guidelines, working procedures and training are needed to minimise the occupational risk to health workers and the infection risk to patients during health-care work.

It is important to put risks in perspective to avoid over-reaction. For instance, HIV risks to carers and other patients are really very small, because transmission does not occur through casual contact. As of mid-1995 it is estimated that around 18.5 million adults and more than 1.5 million children have been infected with HIV since the beginning of the epidemic, leading to an estimated 4.5 million

AIDS cases[1]. More than a million people with AIDS have been treated in hospital and yet there are less than 200 documented instances of occupational transmission. Reliable figures are available for only a few countries where reporting and record-keeping of suspected occupational infections is possible[2]. Recent studies of occupational transmission in Uganda and Zambia indicate that the number of nurses with HIV infection is similar to comparable non-health workers, which implies that the possible risk of occupational infection is extremely unlikely.

Hepatitis

In comparison with risk of HIV infection, the risk of hepatitis infection from health-care work is much higher. The viral hepatitis risk per blood exposure is greater than for HIV (up to 100 times) and the number of patients with viral hepatitis is higher than the number with HIV infection, except where HIV prevalence exceeds 10 per cent in the patient population. The prevalence of hepatitis B infection among health workers in industrialised countries is between two and ten times that of their non-health-worker peers.

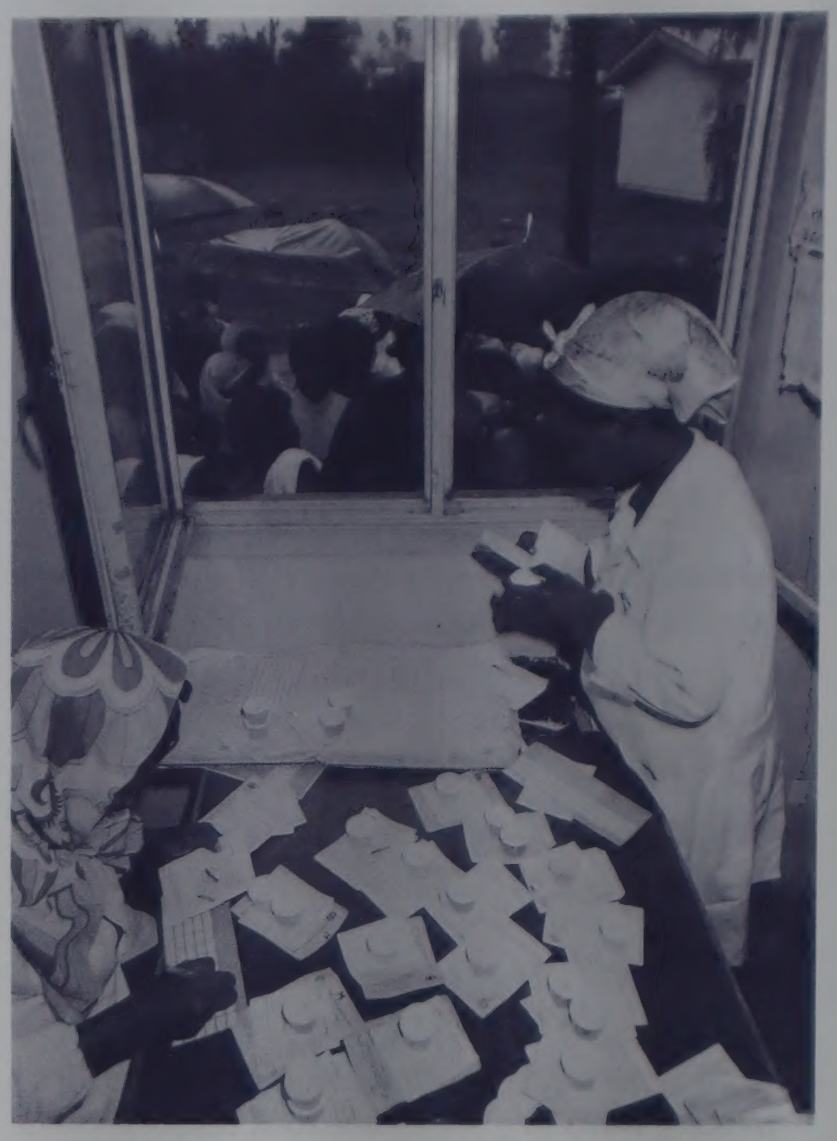
TB

Tuberculosis (TB), the other main occupational risk for most carers in where TB is common, is transmitted by airborne particles – droplets from coughs and sneezes or dust from soiled bedding, clothes or dressings. In most cases it is caused by micro-organisms in the droplets called *Mycobacterium tuberculosis*. The micro-organisms usually enter the body by inhalation through the lungs and can spread to other parts of the body. Although tuberculosis can affect parts of the body other than the lungs, 80 per cent of the cases are pulmonary (lung) tuberculosis, the only form of the disease which is infectious to others.

Potentially infectious body fluids

HIV can be found in sufficient amounts to cause infection to others in: blood, lymphatic fluid, pus, semen, vaginal and cervical secretions, colostrum, breastmilk and cerebro-spinal fluid. It is not present in large enough amounts to cause infection in: saliva, sweat, tears, vomit, urine or faeces unless blood is also visibly present.

Overall, blood is the most important source of HIV, hepatitis B and other blood-borne pathogens in the health-care setting. Infection control efforts for blood-borne pathogens must focus on preventing exposure to blood. Where possible, workers should be immunised against hepatitis B virus as an additional safeguard.



Health workers in Ethiopia collect sputum samples to check for tuberculosis. F McDougall/WHO

When a microscopic examination of sputum specimens from a patient reveals tuberculosis micro-organisms, this is called a smear-positive case. These patients are the most infectious to others. A smear-negative case of pulmonary tuberculosis means that no micro-organisms can be seen in the patient's sputum under the microscope, and these patients are much less infectious to others and have a less severe form of the disease.

Except in cases of prolonged exposure to someone infectious with tuberculosis, only a small number of people exposed will become infected themselves. Most people who become infected with tuberculosis have no symptoms or signs of illness associated with the infection.

The most common symptoms of pulmonary tuberculosis are:

- persistent cough for three weeks or more (every patient with this symptom should be suspected of having tuberculosis)
- sputum production which may be blood-stained, shortness of breath and chest pain
- fatigue, loss of appetite, loss of weight, a general feeling of illness and tiredness, night sweats and fever.

Successful treatment of tuberculosis requires that appropriate drugs be taken for at least six months without interruption. Incomplete

treatment is dangerous to both the patient and others because it can lead to the development of drug-resistent tuberculosis.

Occupational rates of tuberculosis infection can be high where environmental control measures are inadequate. These control measures are quite different from those needed for blood-borne infection control, and are outlined in Section 4.

1.4 How infection can occur

Infection transmission in care settings (hospital, clinic or home) can happen because of:

- accidents (e.g. needle pricks, cuts or blood splashes during procedures)
- carelessness (e.g. pricks or cuts from dangerously discarded dirty needles or blades)
- poor practice (e.g. re-use of equipment without disinfection or sterilisation)
- poor working conditions (e.g. bad lighting or long working hours without rest)
- lack of barrier protection (e.g. staff dressing wounds or undertaking venepuncture without gloves, staff or patients with HIV infection contracting tuberculosis from close contact with people who are sputum-positive for TB).

All of these risks can be controlled if carers and other workers recognise that they could arise and take action to avoid them.

Blood-borne infections can be contracted only if a sufficient amount of virus passes into someone's blood. In the health-care setting this may most easily happen when body fluid infected with HIV or hepatitis B, most commonly blood, is inside a hollow sharp instrument such as a hypodermic needle which is stuck into the health-care worker or someone else, without being properly cleaned and sterilised (needlestick injury). There can also be a slight risk if a large quantity of the body fluid is present and the worker has open wounds on exposed skin or if the body fluid splashes onto mucous membranes or into an eye.

Unhygienic hospital conditions can enable the spread of infections. D Henrioud/WHO

1.5 Problems in measuring numbers of occupational HIV infections

In industrialised countries, occupational transmission of HIV is considered only if health workers develop HIV antibodies (seroconvert) or have an HIV-related illness and:

- the seroconversion follows a significant exposure (a needlestick or blood-splash onto an open wound or onto mucous membranes)
- the health worker's blood is negative when tested for HIV antibodies at the time of the exposure, and
- the health worker reports no behaviour or medical history which is considered to be an HIV risk.

Difficult to prove

In countries with a high HIV prevalence among adults, the real occupational HIV risk may not be noticed because almost all sexually active adults are potentially exposed to HIV. Recent studies in Uganda and Zambia attempted to see if HIV infection rates among midwives, nurses or traditional birth attendants were higher than among their non-health-worker peers[3]. The results of the studies showed that there was little difference between nurses and the comparison group of teachers and office workers. There was no difference in HIV prevalence between village women and practising traditional birth attendants.

Evidence from Uganda shows that the main risks of occupational HIV transmission are needlestick injuries among midwives. Among the midwives in the study 74 per cent reported needlestick injuries, many occurring during the stitching of episiotomies in poor lighting (see Section 2.6). Currently studies are underway to look at how to reduce the risk of needlestick injuries among midwives, especially when doing episiotomy.

Inconsistent reporting of accidents

Attention has been focused on surgeons and less on the risks to junior doctors, nurses, and midwives, as well as other workers in the health-care setting such as cleaners and porters. Surgeons may experience a high number of occupational infection exposures, particularly during deep-body surgery, orthopaedic surgery, emergency surgery and suturing. Junior doctors are less experienced and often overworked which may lead to more accidents. They may feel that they do not have time to report accidents. Nurses, who have the greatest day-to-day patient contact, are poorly paid in comparison to doctors and may feel that they are regarded as less important. They may not voice their concerns or report their accidents because they feel no one will take any interest. Midwives may not report accidents such as blood on their broken skin because they do not recognise the risk or because they think that it is unavoidable. The small risk to cleaners, laundry workers and others working in the health-care setting are also often ignored.

Types of exposure

The type of accident is also important. Needlestick injuries have been most frequently associated with blood-borne infection. The infection risk associated with a single HIV contaminated needlestick injury is estimated to be 0.37 per cent. This estimate should be treated with caution because it is calculated from figures that are not completely reliable. The number of HIV-associated needlesticks is divided by the number of HIV seroconversions. However, some needles had been used for drawing blood and were thus likely to be filled with patient blood at the time of the accident and others had been used for injection and were thus unlikely to contain patient blood. This could lead to an underestimate of risk[2].

Needlestick injuries are not the only route of occupational HIV infection. They are likely to be reported because they are obvious and they hurt. Blood splashes may be more easily ignored or even pass unnoticed; splashes onto mucous membranes in the mouth or eye have caused infection. The risk of a single mucous membrane exposure is estimated to be 0.05 per cent. This estimate is based on one recorded post-exposure seroconversion of 2,203 workers followed[2].

Care should be taken when giving injections to avoid needlestick injuries. WHO/UNICEF

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2. Heptonstall J, Porter K, Gill N. *Occupational transmission of HIV*. Summary of published reports – September 1993. PHLS AIDS Centre at the Communicable Diseases Surveillance Centre, UK, 1993.

3. Studies of occupational risks of infection in Uganda and Zambia, 1993.

2 Strategies for preventing blood-borne infections

Universal precautions should be practised by all carers, with all patients, and in all situations. J Ling WHO

The precautions needed to avoid blood-borne infections differ from those suitable for respiratory infections, such as tuberculosis, or for gastrointestinal infections. Strategies for preventing tuberculosis are discussed in Section 4.

In many developing countries there are no barrier precautions available. Infection control must rely on carers taking extreme caution to avoid contaminating skin breaks with patients' body fluids. Blood and other body-fluid contaminations must be washed or wiped off as quickly as possible. Carers with cuts or open sores on their hands or arms which they cannot cover should not work where direct contact with patients' blood or body fluids is likely.

2.1 Universal precautions

Carers must rely on infection-control practices in order to avoid transmission of HIV and other blood-borne infections in the health-care setting. A list of simple guidelines called 'universal precautions' is recommended[1]. These guidelines are applicable in all health-care settings including the home.

Universal precautions should be followed with every patient. They are based on the assumption that anyone may have HIV or other blood-borne infections. Universal precautions specify the need for barriers such as gloves to prevent skin contact with potentially infective body fluids (see box on page 5 for definitions). Universal precautions may need to be adapted locally to suit health workers' own circumstances.

Care and treatment should be given in such a way as to prevent risk of infection to either carer or patient. The choice and quality of care and treatment provided to the patient should not be influenced by concerns about the risk of infection to the carer.

Carers who are themselves infected with HIV or hepatitis do not pose any HIV infection risk to their own patients unless they cut themselves during surgery when their blood can get into their patients' blood. There is no need for health workers to inform their employers about their HIV infection specifically, but they should tell their employers if they are unable to do some of the

Universal precautions

The risk of transmission of HIV, the hepatitis B virus and other blood-borne pathogens in health-care settings can be minimised if carers and health workers use the following general guidelines for all patients:

1. Take care to prevent injuries when: using needles, scalpels and other sharp instruments; handling sharp instruments after procedures; cleaning used instruments; and disposing of used needles and other sharps.
2. Do not recap used needles; do not remove used needles from disposable syringes by hand; and do not bend, break or otherwise manipulate used needles by hand.
3. Place used disposable syringes and needles, scalpel blades and other sharp items in puncture-resistant containers for disposal. Keep the puncture-resistant containers as close to the place of use as possible.
4. Use protective barriers (such as gloves, eye-glasses, waterproof aprons and waterproof footwear) as necessary to prevent exposure to blood, body fluids containing visible blood and other potentially infective fluids.
5. Immediately and thoroughly wash hands and other skin surfaces that are contaminated with blood, body fluids containing visible blood or other potentially infectious body fluids.

work expected of them. In the UK, for example, any surgeon or theatre assistant who is found to have hepatitis B is required to cease undertaking invasive procedures (surgery, suturing, and 'fingers inside the patient').

2.2 Home-care precautions

It is important to emphasise that HIV and hepatitis B are not spread during normal social contact. People should not worry about getting other sexually transmitted diseases, like syphilis or gonorrhoea, from this type of contact and they should have no greater worry regarding HIV or hepatitis.

However, it is important for people with HIV infection to avoid other common infections that are spread by normal social contact, such as diarrhoea and respiratory infections. People with HIV may have a weakened immune system and can get infections more easily. Each infection can weaken their immune system further. However, contact with healthy people poses no health risk.

Relatives, friends and workers providing home care should take the following precautions so that they can care for people with HIV infection or AIDS without endangering them with common infections and without fear of HIV infection to themselves[2].

- Wash hands with soap and water after changing soiled bedsheets and clothing, and after having contact with body fluids.
- Keep wounds covered. Both carers or people with HIV should cover any skin lesions or open wounds they may have on their hands or other places likely to have contact with other people, their bedding or clothing. Cover open wounds with a bandage or cloth. Use a piece of plastic or paper, gloves or a big leaf to handle soiled items.
- Keep bedding and clothing clean. This will help keep sick people comfortable and prevent skin problems. If you follow the first two rules above, the risk of transmission of HIV through contact with soiled bedding or linen is extremely low.
- Do not share sharp or skin-piercing instruments. Do not share toothbrushes, razors, needles or anything that can cut or come into contact with blood. If it is necessary to share these types of objects, boil them in water before use.

To clean clothing or sheets stained with blood, diarrhoea or other body fluids:

- keep separate from other household laundry
- holding an unstained part, rinse off any blood or diarrhoea with water – be particularly careful if there are large amounts of blood, such as after childbirth
- wash in soapy water, hang to dry and fold or iron as you would normally.

Any action beyond this, such as the use of bleach or boiling water, will also be effective but is not necessary.

2.3 Providing first aid

First aid is emergency care to sustain life. It is concerned with keeping an oxygenated blood supply to the brain. It is needed when someone has stopped breathing, is unconscious or when there is uncontrolled bleeding.

Someone who gives first aid needs to understand the potential risks of helping. Among other safety considerations, such as fire, poisonous fumes, or downed electrical wires, the risks of disease transmission when there is the possibility of exposure to a victim's body fluids should be considered.

For those giving first aid, contact with someone else's blood is sometimes unavoidable. To minimise the hazard of HIV and hepatitis from this blood contact the following guidance should be given to all health staff and first-aiders:

- Avoid skin, mouth and eye contact with blood. Wear gloves if possible, and take particular care if you have damaged skin, particularly on your hands or face.
- Clean any blood off as soon as possible and wash the area with soap and water.
- Do not give direct mouth-to-mouth or mouth-to-nose resuscitation if the casualty is bleeding from the mouth or nose.

2.4 Testing for infections

Carers cannot rely on knowing who has HIV or hepatitis B. For every person recognised by health workers as having HIV infection, there will be many others whose infection is not recognised. Diagnosis of HIV infection is impossible without a blood test or until the patient develops clinical symptoms indicative of AIDS (which may not be until ten years or more after infection). Even when the patient has symptoms, a diagnosis of AIDS is not straightforward and requires clinical skill and experience.

How to scrub

You will need:

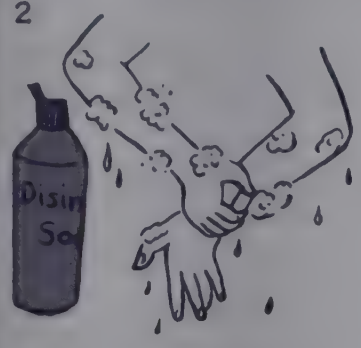
- Clean or boiled water
- Soap – ordinary soap is good, disinfectant soap is better
- A brush to clean the fingernails

(You can mix disinfectant and regular soap if you want to.)

1

Take off rings and other jewelry and put them away.

2



Soap your hands and arms – all the way up to your elbows!

3

Make sure to scrub in between your fingers.

4

Scrub the nails with a clean brush. (It is even better if the brush has been dipped in disinfectant.)

5

If possible, keep scrubbing, brushing, and washing your hands and arms for 5 whole minutes!

6

Rinse with boiled, cooled water.

7

It is best to let your hands dry in the air instead of using a towel. Do not touch anything until your hands are dry.

8

In an emergency, when you don't have the time to scrub – or if you don't have clean or boiled water – you can splash and rub your arms and hands with alcohol or disinfectant. This is better than doing nothing to clean the hands and arms.

Adapted from: A book for midwives: a manual for traditional birth attendants and community midwives, S. Klein, 1995.

It would not be possible to identify all HIV infections even if all patients' blood were to be tested because the appearance of detectable antibodies to HIV usually takes 6-26 weeks after infection. This is called the window period. The individual is infected, and infectious to others, but shows no antibody sign in their blood. For a few people, the window period may be indefinite: they may never develop detectable antibodies and may always have false-negative blood-test results.

The cost and time involved in counselling and testing all patients make this policy impractical in any country. In resource-poor countries and resource-poor parts of the health sector of industrialised countries, money, time and the necessary training in testing and counselling is not available for HIV antibody testing except sometimes when it is in the direct interest of the patient[3].

If workers understand how and when risks arise they will be able to plan the safest ways to work. There is no justification for testing patients' blood for HIV antibodies or for advocating that patients' blood should be tested.

Hepatitis B is a prevalent infection in most parts of the world. Where patients have hepatitis B, exposure to their blood poses a significant risk to others. However, there are no policies in operation which require patients to be tested for hepatitis B antibodies before health care is given.

Health managers and health workers need to develop and use working methods which respect and assure patient confidentiality. Information about an individual's HIV status should never be divulged unless it is in the person's interest. This does not always happen, and staff and other patients can be very persistent in seeking and finding information about people's HIV status. Even the use of codes in patient records provides little security. In many countries doctors never write anything about HIV in patients' notes as this is the only way to protect their confidentiality.

When someone is infected with HIV they need to think about who should know about their infection. The information is confidential and only the person concerned should decide who is told. This is a difficult matter. Once someone has been told they may tell others, and yet people in distress often need to tell some of those close to them so that they understand the illness and can give support. People need to think carefully and a counsellor can help by listening and

providing information to help them to make a decision, and to help them inform their partners and family members where appropriate.

2.5 Preparing for work

Clean, intact skin is an excellent barrier to HIV[4]. There is an extremely low risk of infection from HIV or hepatitis if blood comes into contact with unbroken skin.

However, it is possible that the virus could enter the worker's bloodstream where the skin is damaged. This is most likely where there are open cuts or abrasions or if the blood remains in contact for a long time.

To minimise these risks, the following precautions should become part of each worker's preparations for work:

- Examine the skin of hands and forearms for large cuts, abrasions, insect bites, blisters or other damage before starting work. Any open wounds should be covered with a waterproof dressing. If this is not possible, wear gloves all the time, or avoid work where there may be direct contact with blood.
- Whether or not gloves are to be used, keep nails short because infectious fluids may lodge under them and because the skin under them may become damaged or fragile.
- If jewellery such as a wedding band or signet ring is worn, it must be covered with waterproof dressings. Sharp or protruding rings should always be removed because they may injure patients. Bracelets and bangles should be removed or secured so that they cannot fall down the wrist onto the hands during work.
- Wash your hands and forearms thoroughly with soap and water before and after caring for a patient. Avoid damage to the skin and particularly to any areas that are healing up. Take care with scrubbing brushes because these may damage the skin if used too harshly.
- Carefully wash, with soap and water, any blood or other body fluids from your skin (or other areas such as eyes, using water only) as soon as possible. Take care not to damage the area when doing this.

Remember that soap and water are the core of infection control. The use of disinfectants is an addition, not an alternative.

If gloves are not available, minimise skin contact with body fluids and wash hands with soap and warm water after contact. Laundry and soiled clothing should not be touched directly, and could be collected using sticks or plastic bags to avoid direct contact.

2.6 Precautions to reduce exposure

Carers are at greater risk when tired or working too quickly. Accidents are also more likely if workers are nervous or inexperienced. Accidents involving sharps are made more likely if the sharp is handled by more than one person at the same time. Needles and scalpels should be passed from one worker to another via a tray or table top, and should be safely disposed of.

Gloves and other barriers

Household rubber gloves can be used for general housekeeping chores involving potential blood contact, and for instrument cleaning and decontamination procedures. They are ideal for handling neat chemical disinfectants.

Latex gloves should be used if contact with blood or body fluids is likely. If gloves are in short supply, keep them for when they are needed most, such as when the worker's skin is damaged and when extensive and prolonged blood contact is expected, such as when the patient is bleeding profusely, when the carer has to insert a catheter into an artery, or during childbirth, for example.

This traditional birth attendant has received training in the importance of clean hands and aseptic conditions when delivering a baby. J Ling/WHO

Notes on using and re-using gloves

- Use gloves when:
  – the carer or health worker has cut or broken skin and is performing procedures involving blood collection or transfusion or assisting in childbirth;
  – contamination with blood is likely because there is an emergency; the patient is unco-operative or unpredictable;
  – the carer or worker is being trained.
- Use sterile gloves for procedures involving contact with normally sterile areas of the body, for example during surgery.
- Use clean, disinfected gloves for procedures involving contact with mucous membranes and for other patient care not requiring sterile gloves.
- Change gloves between patients.
- If there are not enough disposable gloves for a one-use only policy, wash and disinfect gloves carefully for re-use.
- If gloves are to be re-used, they should be inspected and damaged ones disposed of safely. Intact gloves should be washed clean of any blood or body fluids using water, but not soap, before sterilisation (see Section 3.3).
- There may be no benefit from wearing two pairs of gloves, and using two pairs doubles the cost. Some people find them more difficult to work in and they may actually increase the likelihood of accidents because of the loss of touch sensation and stiffness of movement that they cause. Needles and other sharps will pass as easily through both pairs as through just one, although many people who regularly double-glove report frequently finding that an outer glove alone is damaged. If the outer glove is damaged, both must be changed because of the danger of unnoticed damage to the inner glove, causing prolonged skin contact with infectious material. If two pairs are used, then both sizes should be half a size larger than for a single pair.

Remember that gloves are soft barriers and will not protect against penetration of the worker's skin by sharp objects. Thus all sharp objects must be treated with care, especially if they have been in contact with patients.

Splashes and sprays of blood or other infectious body fluids can cause infection via the eye. Workers who wear eye glasses have some protection from these. Where there is a high risk of body fluid splashes, for instance when working on arteries or during bone-cutting in orthopaedic surgery or autopsy, protective goggles should be worn if possible.

Precautions for midwives

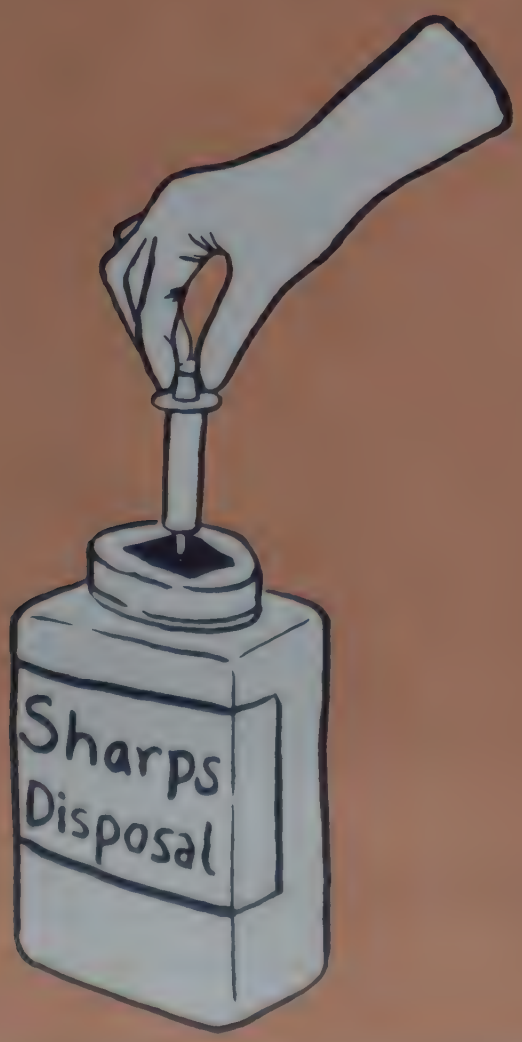
Midwives and other people who help women during childbirth may be at risk of infections because of their close contact with blood during delivery. They often face difficult conditions, particularly when working in homes. Lighting may be poor and there may be inadequate supplies of water, firewood (to boil water to sterilise instruments), soap and gloves. Also they may not have had adequate training in how to reduce infection risk.

Poor lighting increases the chance of needlestick injuries, especially when sewing a tear or episiotomy. Improved lighting, wearing gloves, and where possible using protective items such as thimbles, a protective

Making a sharps-disposal container

Old containers made of thick plastic can be easily adapted to handle the disposal of sharps. A hospital in Tanzania uses old half-litre tablet bottles. They cut a slit into the plastic lid (approximately 2cm x 3cm – large enough for needles and scalpels) and tape the lid securely to the bottle. These are clearly labelled and placed in each ward and department where needles and other sharps are used. The half-litre size was selected instead of larger bottles because they fill up faster and are disposed of more often.

Source: Georgina Stock, Dareda Hospital, PO Box 247, Babati, Arusha region, Tanzania.



finger covering used for needlework, can help reduce risks.

Avoid procedures which are not absolutely necessary. Most tears do not need sewing unless they are bleeding heavily. An episiotomy should only be performed when it is needed to save the life or health of the mother or baby and when there is somone trained in how to sew it afterwards[5].

Touch the placenta as little as possible and dispose of it carefully. Burn it or bury it it in a place where it will not be dug up[6].

2.7 Safe disposal

Contaminated material, gloves and equipment can be an infection hazard especially if needles or other sharp items are present. All contaminated waste should be stored where it can cause no accidents and should be disposed of by burning or burying as soon as possible. Infectious hazards will not be recognised by children looking for toys, nor will the possibility of contamination always discourage those collecting scrap materials or drug-users looking for injecting equipment.

Waste can give rise to accidents and infection exposure because only rarely does anyone in authority take responsibility for it. If the senior staff, doctors, nursing sisters or laboratory managers do not make sure that waste is safely contained and that it is safely collected, transported and disposed of, then junior staff and cleaners could have accidents and become infected. Health managers must make sure that all staff are informed about the dangers from discarded sharps and infectious material. They must supervise the collection, transport and disposal arrangements. They must look to see what is actually being done.

Infectious spillage and waste are particular hazards because they are of no direct interest to health workers who may then be careless about decontamination and disposal. The cleaners, laboratory attendants and porters who work with spillage and waste are at risk and are often poorly trained, motivated and supervised. Examples of accidents in this situation are common. These everyday occurrences will stop only when managers of hospitals, clinics and laboratories assume responsibility for all of the staff under their authority and make sure that they are all properly trained, instructed and supervised.

Discarded sharps must be put into a robust container such as a thick plastic bottle or metal tin. They should never be collected in the same waste container as non-hazardous waste. They should be removed from the clinic, ward or laboratory before the sharps container is overflowing. They must be carried carefully to a pit for burying or burning. Needles should be bent to prevent re-use only if this can be done safely.

Sharps should be handled by only one worker at a time and they should be placed in a secure-disposal container immediately after use. If sharps are to be re-used, a procedure for rigorous cleaning prior to disinfection is needed. In practice it is difficult to clean the bore of a needle, and re-use of needles should be discouraged.

When disposing of needles and sharps, remember:

- Choose a puncture-proof safe-disposal container (plastic or metal) which is big enough for a whole day's-worth of items.
- Make sure the entrance of the safe-disposal container is big enough for all the items which should go in it.
- Label the safe-disposal container clearly so it is only used as intended.
- Place the safe-disposal container close to where the needles or other sharps are used so that people do not have to carry needles or other sharps around to use the safe disposal container.
- Make sure all the workers, including cleaners and porters, know why the safe-disposal container has to be used and how it should be used.
- Put someone in charge of the safe- disposal container to be responsible for making sure that people use it properly, that it does not get overfilled and that it is emptied properly.
- Dispose of the safe-disposal container when full, or empty it carefully into the fire or pit used for the disposal of needles and other sharps.
- Make sure that the contents of the safe-disposal container are properly burnt or buried and that children or people who might pick through the rubbish cannot contact waste which may harm them.

2.8 Accident procedures

A list of actions to take in the event of accident should be compiled, and health managers must make sure that all staff understand and follow these procedures. Model procedures for accidents involving personal exposure are given here as an example. (Some points have already been covered above but are repeated here for completeness.)

Procedures for dealing with accidents, such as needle-stick injuries, should be followed by all health workers.
Paul Smith/Panos Pictures

- All accidents should be reported to the health manager so that correct action is assured and steps are taken to avoid similar exposures in the future.
- Accidents involving spillage of potentially infectious body fluids should be immediately dealt with. Spills should be prevented from spreading, and people should be prevented from coming into direct contact with the body fluid. The fluid should be collected and disposed of as a hazardous waste and the contaminated area should be decontaminated and cleaned using disinfection procedures. Care must be taken to avoid exposure to the workers dealing with the spill.
- If there are splashes or other contamination of the skin or eyes with blood or body fluids, the affected area should be washed as soon as possible using soap and water (water alone for eyes). No one should ever scrub their skin so that it is damaged, nor should disinfectant chemicals ever be used directly on the skin.
- If a worker is cut or accidentally pricked with a needle, the wound should be encouraged to bleed and should be cleaned with water and mild soap, if available. Afterwards bleeding should be stopped and the wound treated with a clean waterproof dressing.
- Following an accident where HIV transmission may have occurred, the health worker concerned will need counselling and support. The World Health Organization advises that the HIV infection status of the patient involved should be determined if possible and the health worker should be given an HIV antibody test soon after exposure and six months later. Meanwhile, they should receive counselling and advice on safer sex. If they are ill in the weeks after exposure, they should receive medical attention and further counselling. All of this support should be non-judgemental and confidential[1].
- The use of antiviral prophylaxis such as zidovudine (AZT) should be guided by local policy. Drugs such as zidovudine are very expensive and often not available in developing countries. Even where antiviral drugs are available, their benefit as a prophylaxis is unproven. As working experience with antiviral drugs develops, the guidance given keeps changing and cannot be specified here.

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3. For further information about HIV testing, see AHRTAG's briefing paper *Practical issues in HIV testing*, 20 pages, 1994. Available free to developing countries, and £2.50/US$5.00 elsewhere from AHRTAG.
4. Bailey, MR. Skin protection, *AIDS Action*, issue 19, December 1992.
5. From *A book for midwives: a manual for traditional birth attendants and community midwives*, S. Klein, Hesperian Foundation, 1995.
6. From *Training manual for traditional birth attendants*, G. Gordon, MacMillan Education Ltd., 1990.

Avoid touching soiled areas of laundry.
Normal washing and drying will kill HIV.
Adapted from AIDS home care handbook, WHO, 1993.

3 Cleaning, disinfection and sterilisation

All equipment used in the health-care setting should be treated to prevent the transmission of infection. This is especially important for items which will be re-used. In resource-poor settings there may be no choice but to treat and re-use items such as needles and gloves normally discarded after use by one person.

3.1 Procedures

There are different procedures for treating equipment and materials used in a health-care setting. All disinfection and sterilisation methods kill HIV and hepatitis viruses.

Cleaning is the physical process of removing all visible blood and body-fluid contamination from equipment, fabric, surfaces and skin. Disinfection and sterilisation methods can only work properly on equipment and gloves that have been thoroughly cleaned of blood and body fluids beforehand. The degree and type of cleaning necessary will depend on the amount of contamination and on the local circumstances. Where the prevalence of HIV infection is high, used equipment and gloves can be immediately soaked for 30 minutes in a suitable chemical disinfectant before further handling for cleaning and sterilisation. Where there are large amounts of blood or body fluid, the cleaning should be done by washing with chemical disinfectant solution and then with water. It may be necessary to wipe the items to remove some contamination. This should be done with caution, being careful not to splash fluid onto skin or into eyes or mouth.

Spills of patients' body fluids should be cleaned up immediately. This is particularly important where areas are crowded and where people are sometimes barefoot. The area of the spill may be flooded with disinfectant to dilute the infectious fluid and make it easier and safer to mop up. The mixture should then be mopped up and the surface wiped again with disinfectant. The mopped up fluid should be treated as infectious waste even if it has been diluted with disinfectant. Absorbent material such as sawdust or soil should be used to contain large spills of blood and the contaminated material buried. Household rubber gloves should be worn to protect hands, and waterproof aprons and footwear used where large quantities of fluid are involved.

Sterilisation means treatment to remove all infectious hazard including that from tetanus and bacterial spores. Heat is the most effective and dependable method for inactivating HIV. Complete sterilisation can be achieved only by using dry heat in an oven at 170°C (340°F) for two hours or by steam sterilisation in an autoclave or pressure cooker operating at a pressure of one atmosphere (101 kPa, 15 lb/in^2) above atmospheric pressure, for a minimum of 20 minutes. With either method, care must be taken to ensure that the correct temperature is maintained for the prescribed time in one unbroken run. Attempts should not be made to sterilise plastic containers since they could harbour infections. Containers made of glass or metal may be sterilised following normal sterilisation procedures.

Disinfection means treatment to remove all infectious hazard from viruses and bacteria except that from tetanus and bacterial spores. Disinfection can be achieved by heat by immersion in boiling water (100°C, 212°F) for 20 minutes. This simple method is best for disinfection if fuel and water are available and if the water boils at the correct temperature.

The timing must not be started until the equipment is in the water and the water has started to boil. The boiling temperature must be maintained for the whole time. Do not add further items halfway through.

Disinfection can also be achieved by the use of some chemicals. Chemical disinfectants are for external use only. They will not act as medicines or as protective therapies. Chemical disinfectants must never be swallowed or injected. Bleach is the most cost-effective and easily available disinfectant chemical at household, dispensary, health-centre and hospital level.

Chemical disinfectants are effective only if they are fresh, properly stored, and are made to the correct dilution with clean water. Items to be disinfected must be thoroughly cleaned and all the surfaces must be submerged and treated for a sufficient time (at least 30 minutes).

Specialist medical equipment such as fibre-optic sigmoidoscopes and dialysis machines require specific chemical disinfection procedures recommended by their manufacturers and suppliers. The standard procedures specified for these instruments and machines will be effective against HIV if they are properly carried out.

3.2 Cleaning and laundry

If clothing or sheets are soiled with body fluids, try to handle them without touching the soiled areas. If gloves are not available, use a piece of paper, plastic, cloth or even a large leaf as a barrier to pick up the item. Small plastic bags, put over hands and tied around the wrist at the top, can be used instead of gloves for this.

Wash soiled items separately from other laundry, wearing gloves while doing so or trying not to touch stained parts. Soak in warm soapy water for some time and rinse off any blood or diarrhoea before washing. Wash in hot soapy water, and dry as normal, in sunlight if possible. Bleach solution or boiling water can be used, but are not necessary. Normal washing and drying will kill HIV.

3.3 Gloves

Latex gloves can be safely used again provided that they are undamaged and can be thoroughly washed and sterilised or disinfected after use with each patient. Sterilisation of gloves for re-use should only be contemplated where conditions allow cleaned and disinfected gloves to be sterilised and packaged. Sterilisation procedures must also be regularly monitored for effectiveness.

Better quality latex gloves (often the more expensive ones) will withstand re-use much better than poor quality gloves. If possible, household rubber gloves should be worn while cleaning other used gloves, to avoid contaminating the hands. A local procedure for glove cleaning and re-use should be developed and adopted.

After use, the gloves should be inspected. Damaged ones should be discarded and disposed of safely. Intact gloves should be washed clean of any blood or body fluids using water but not soap. Soap can make the latex sticky and easy to break.

- Household gloves can be decontaminated and re-used but should be discarded if they become holed, cracked or if they are showing signs of wear.
- Before disinfection, gloves must be re-examined for damage by either gently blowing them full of air, twisting the cuff and holding them under clean water, or by

General rules for all procedures involving the use of chemical disinfectants

1. Store concentrated stock away from light and heat.
2. Make working dilutions daily, and never re-use diluted solutions.
3. Follow the instructions given by the manufacturer or supplier and written on the chemical container.
4. Always clean visible blood, body fluids and other organic material from surfaces before disinfecting with chemicals, except when dealing with large spills where disinfectant may be used in excess to dilute the hazardous fluid.
5. Allow 30 minutes contact time for disinfection.
6. Always wash items thoroughly in clean water after chemical disinfection and allow to dry.
7. Always handle chemical disinfectants with care, wear gloves, and avoid skin and eye contact.
8. Care should be taken to avoid burns and irritation of the skin or eyes from chemical disinfectants. If there is irritation, wash the affected part with clean water until all the chemical is removed.

Important: disinfectants such as Savlon or Dettol which are based on hexachlorophene, chlorhexidine or quaternary ammonium compounds may be ineffective in inactivating HIV and should not be used as a disinfectant when HIV infection risk is possible. Savlon may be useful when used as a treatment for opportunistic skin infections, in some cases proving more effective than antibiotics.

filling them with clean water, twisting the cuff closed and squeezing them to see if they leak. Any damaged gloves must be discarded.

- Disinfect the gloves by either: immersing them in boiling water for 20 minutes; or soaking them overnight in sodium hypochlorite (bleach) solution (see Table 2); or autoclaving them.
- The choice of method will vary with locally available resources and the make of glove used. Each method should be tried out on a different batch of used gloves to find out which is most convenient, and causes no deterioration (stickiness or tiny breaks). Good quality latex gloves should withstand boiling or bleach immersion five or more times, but autoclaving weakens them after about five times[1]. Gloves must always be tested for damage following disinfection or immediately before sterilisation.
- Gloves should be dried, out of direct sunlight, and their insides dusted with talcum powder or starch powder before re-use.

It will take time to work out the most suitable method for local circumstances. Each worker needs to be given training and the time to go through the re-use process. Similarly, families and home carers should be helped to work out ways to re-use gloves where necessary.

After disinfection (and immediately before sterilisation) gloves must be examined again for damage. This is done by either blowing them full of air, twisting the cuff closed and holding them under clean water or by filling them with clean water, twisting the cuff closed and squeezing them to see if they leak. Any damaged gloves must be discarded.

The gloves should be dried out of direct sunlight. They should be re-lubricated with talcum powder, if it is available, or starch powder otherwise. Oil-based lubricants must not be used as these weaken the latex.

3.4 Needles and instruments

The re-use of needles demands special care to ensure that all material is removed from the bore of the needle by flushing it with an appropriate disinfectant before sterilisation. Chemical disinfectants should not be used for the final treatment of needles to be re-used. As the effective cleaning and sterilisation of needles presents practical difficulties, the re-use of needles should be avoided wherever possible.

Experience from one Asian country

Surgical gloves in Cuba are drying for re-use away from direct sunlight. Paul Schatzberger/Panos Pictures

teaches that re-use of needles could be substantially reduced if injections are given only when absolutely necessary rather than whenever patients request them. This can be done if a rational injection policy is developed and implemented.

Reference

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4 Preventing tuberculosis

Uncurtained windows enable sunlight to kill tuberculosis micro-organisms. C Stauffer/WHO

Tuberculosis (TB) is spread as infectious particles through the air, either directly from person to person via coughing, or indirectly on dust from bedding, dressings, floors etc. For this reason, it is crucial to identify, isolate, and treat people with TB to minimise risks to others. Proper ventilation, increased sunlight, and good working practices can also help to reduce the risk of infection.

The rise in clinic and hospital patients with HIV is mirrored by a rise in patients with TB. In many countries, one in three or one in two patients with HIV infection also have TB. These infections interact. Patients with pulmonary TB are infectious to others, especially to those with HIV. People who have a latent TB infection have a high chance of that infection being reactivated if they are also infected with HIV.

4.1 Isolating infectious patients

All patients with a cough of more than three weeks' duration should be screened for TB by sputum smear microscopy for acid-fast bacilli and treated as necessary[1]. Rapid diagnosis and treatment is the best way to reduce the risk of further infections, since people become much less infectious soon after the start of treatment.

When a person is suspected of or diagnosed with TB they should be isolated from other patients who do not have the disease. They should also be isolated from patients and staff known to have HIV infection during the initial phase of their treatment. Patients suspected of having TB who are known to be infected with HIV or to have AIDS should not be admitted to a TB ward until their TB treatment has been started.

4.2 Making the environment safer

Accommodation for people with TB should be kept well ventilated with doors closed and windows to the outside open, to reduce the chance of airborne infection. Exhaust fans are useful for moving air from tuberculosis wards and isolation rooms to the outside. In colder climates it may be necessary to keep windows closed, but fans blowing air outside may be useful.

Sunlight is a cheap source of ultraviolet light which kills airborne TB micro-organisms. If possible, patient rooms should have large, uncurtained windows.

4.3 Safer working practices

Working methods should avoid creating dust which may contain TB micro-organisms. For example, dry sweeping and shaking bed clothes should be prohibited.

Carers should keep the patient's room aired and should avoid dry sweeping and shaking out soiled bedding and clothing indoors. Soiled bedding and clothing should be washed immediately using soap and hot water.

Outpatient clinics where patients are screened for TB should be well ventilated, and sputum specimens should be collected in an area away from general waiting rooms and other people.

Infectious patients with uncontrolled cough should wear masks when being moved around the hospital or clinic. Alternatively, patients can use a clean handkerchief or cloth tied over their nose and mouth. Surgical or other masks will reduce infection risk from coughs and sneezes when worn by patients with pulmonary TB but are no help in stopping infection when worn by anyone else. For this reason it is not generally recommended that masks are worn by staff and visitors.

Reference

1. Control of tuberculosis transmission in health care settings, *Weekly Epidemiological Record*, no. 68, 1993.

5 Managing and training for infection control

Health workers should treat all patients equally and regard everyone as potentially infected.
WHO/INTERPHOTO

People with HIV, hepatitis or other infectious diseases have the same right and should have the same access to health care as anyone else. The treatment and care given to people with HIV and other infections must be as good as that provided for other illnesses. Otherwise the message is that these are second-class diseases and those who have them are second-class citizens. This denies dignity to people with these infections and may hasten their illness and death. It may also isolate people from treatment information and HIV prevention and control messages, and thus further the spread of HIV and TB.

Managers, clinical staff and home carers need to understand the reasons why they should regard all patients as possibly infected with HIV, hepatitis or other infectious diseases, rather than attempt to identify those who actually are. Once established, this protocol improves the attitude of staff towards patients by diminishing discrimination against people diagnosed with AIDS or who are known to have HIV infection. It relieves the tension of wanting to know the HIV status of each new patient. It avoids operating a two-tier system of precautions and risking inadequate precautions with someone whose HIV test was false negative. It means that all patients receive the best possible care regardless of their HIV status.

5.1 Responding to irrational fear

The fear of occupational HIV infection has prompted some staff to demand higher salaries. It has also made it difficult to recruit staff for some types of health work. The best response to this is information about hazards, and modification of working practices to minimise them. All health work carries some risk and the HIV risk is much less than many other infection hazards. For instance, hepatitis B is contracted much more easily from occupational exposure than HIV and has a significant mortality rate among health staff in many countries.

The control of occupational infection risk relies on simple precautions which should be as applicable in a rural health clinic as in a high-technology intensive care unit. Health managers and health workers need to be trained to recognise and assess hazards and to apply general principles of hazard control to the way they do their work.

5.2 Who needs training?

Too often, information and training about the prevention and control of infectious diseases are limited to senior health workers, doctors, and nurses. Others involved in health work such as midwives, home carers, cleaners, porters, and laundry attendants may be overlooked because of the mistaken belief that they are not at risk of infection or because they are thought to have little or no role to play in infection control.

Training courses and on-the-job training are needed for all staff. In particular, nursing supervisors and doctors need to set an example and establish a culture of good hygiene and infection-control procedures in all health settings. The professional standards expected in operating theatres should extend to all places where patients receive care. These do not need to be elaborate precautions, but are more a case of good practice, such as: wearing gloves for dressing wounds, venepuncture and delivery; washing hands and changing gloves between patients; safe

waste handling and disposal; and disinfection and sterilisation of instruments between patients.

Health managers and those concerned with providing and co-ordinating community-based health services, such as nurses, doctors, dentists, midwives, traditional birth attendants, traditional healers, herbalists, community health workers, voluntary health workers and peer educators should prioritise the occupational safety needs of these practitioners. These same precautions should be adopted by tattooists, skin-piercers, circumcisors and barbers.

Information and training should be given to all these groups of people on:

- minimising blood contact with skin
- handwashing before beginning work and between each patient
- the use of sterile needles for injections, and sterile knives and razors for skin-piercing and cutting
- either not re-using instruments, or cleaning and boiling instruments to be re-used between each patient.

5.3 Training and good practice

Carers need to learn how to analyse their working practices so that they can identify high-risk and low-risk situations for themselves and others. They need to know what action can be taken to reduce any risks. Carers can do this if they understand how infectious viruses in patients' body fluids can get into their own blood and how this can be prevented. They need to recognise when risks are high and judge how to reduce those risks.

Training should include initial instruction, on-the-job practice with supervision, refresher training on a continuing basis and retraining when changes in working conditions or information require it (see box below).

Learning through experience

Training on HIV/AIDS for health workers in Trinidad and Tobago had been conducted since 1983, but health centre staff were experiencing problems. Although the health workers felt that they had received good information, patients reported that health workers tried to avoid treating or touching them, and would not visit them at home.

The training had covered issues concerning sexuality, prejudices and religious beliefs during lectures, but nurses' attitudes had not really changed. Many were still afraid of being stigmatised through contact with people with AIDS and that they would be infected with HIV.

These factors influenced the design of a modified training programme developed in 1990. The programme focuses not only on increasing knowledge but also on changing personal attitudes, reducing fears and increasing self-awareness.

Teaching methods in the modified training reflect the fact that adults learn better when they experience the issues more personally. Exercises such as role play make situations seem more real to the trainees, and involve everyone in the group. Infection control is not covered in a theoretical way, but is integrated throughout the training and dealt with as issues arise.

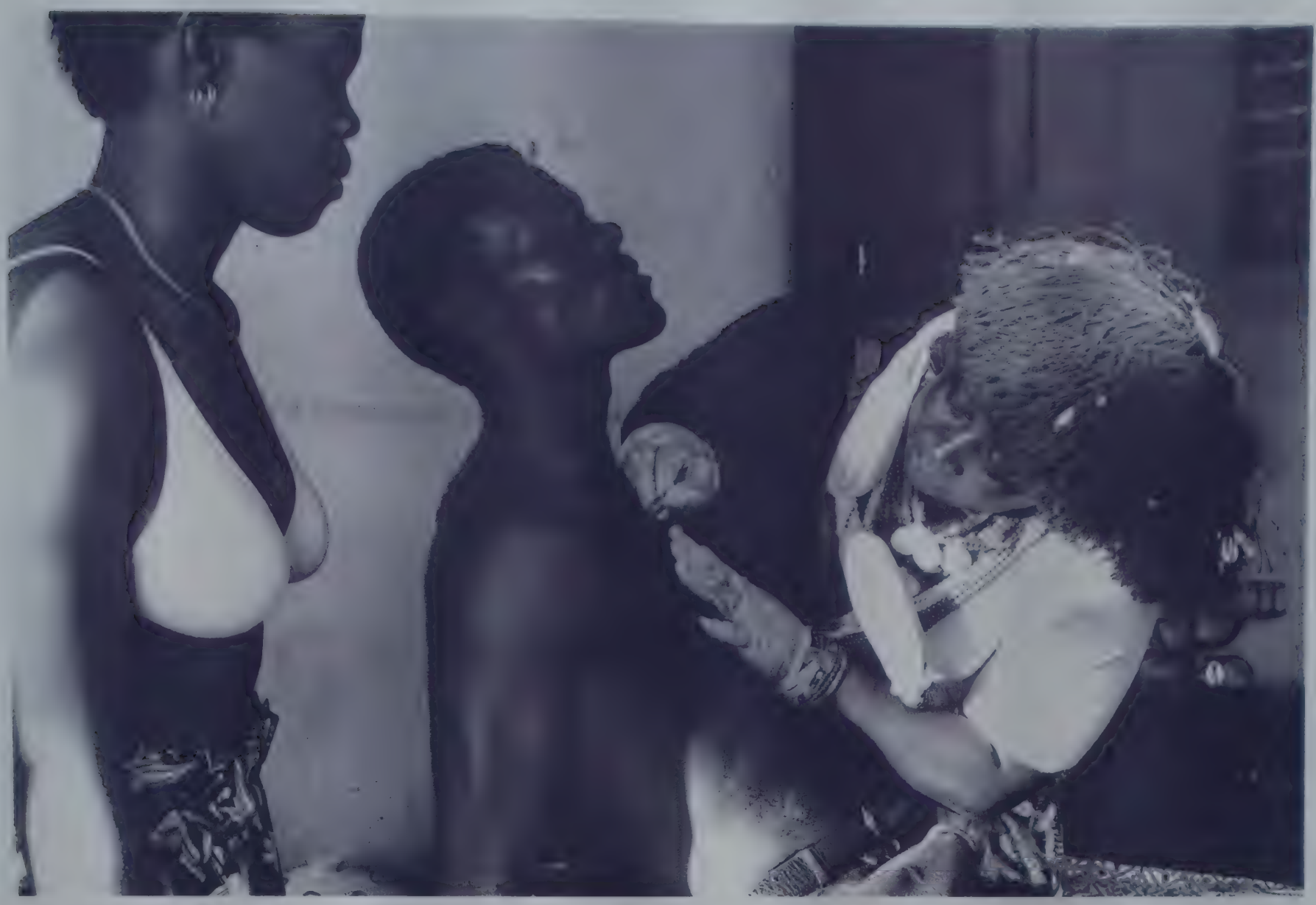
Small groups of 10-15 people attend the training course. The course is one day a week for eight weeks, and is held in an informal and relaxed environment. Training content varies according to participants' needs. They complete a questionnaire before the start of the course, and also discuss what they want during the workshop sessions.

The small group sessions also make it easier to identify nurses who continue to have concerns about the risk of infection. The facilitators have found the most effective way of helping them to overcome irrational fears about infection is to ask how they would feel if they were themselves infected with HIV. This helps the group confront the issue from a personal perspective and understand how others feel.

HIV-positive people are invited to join in discussions, along with their family members and experienced nurses. In one session the mother of a son who had died of AIDS explained to the nurses how she was able to overcome her own fears about infection risk when caring for him at home, providing a powerful example and giving the nurses an opportunity to discuss their own concerns.

After the training, the nurses are encouraged to continue discussing the issues with their colleagues. Health centre co-ordinators are also able to contact AIDS programme staff with any problems. Support groups for the nurses themselves have been set up, where they can share experiences and advise on problems.

Source: *AIDS Action*, issue 19, December 1992, contributed by Janey Parris, AIDS Programme Co-ordinator, Eric Williams, Medical Sciences Complex, Mt Hope, Trinidad and Tobago; and personal communication with Janey Parris in November 1995.



A traditional healer in South Africa has been trained to carry out skin piercing by using rubber gloves and a clean blade with each patient. Gisele Wolfsohn/Panos Pictures

In some cases, clinical staff will find that they can reduce hazards by modifying their procedures. This may mean changing the way operations are performed, adapting suturing or venepuncture practice, revising childbirth assistance and gynaecological examination. These safer working methods should be incorporated into clinical skills training and skills refresher or revision training will be needed for practising staff.

Good practice also depends on good management. Health workers must receive appropriate training and supervision, and have a regular supply of fuel (for boiling and autoclaving) and sufficient instruments to implement infection control. ■

Experience with traditional healers

The clinic's home care officer reported that several people with TB/HIV did not stay in contact with the clinic and were lost to follow-up. It was later realised that they had sought the care of traditional healers or spiritualists, believing that their condition was caused by evil spirits. Several patients were staying with spiritualists, along with other patients and their carers.

Health and community workers from the clinic therefore began to work with the traditional healers and spiritualists. During a series of workshops, we learnt a lot about their methods of caring, some of which enhance the transmission of both TB and HIV. This highlights the need to include traditional healers in training activities. For example, healers and other community members can learn low-cost methods of infection prevention, such as using plastic, paper, gloves or a big leaf to handle soiled dressings, and using gloves or plastic bags over hands for dressing wounds, delivery, or other practices involving potential contact with infectious body fluids.

Source: St Martin's Clinic, Agomanya, Ghana, reported by Sister Margaret Mensah.

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Table 1: Hazard table for blood-borne infections

WORK ACTIVITY	PRECAUTIONS TO BE TAKEN	ESTIMATE OF RISK IF EXPOSED
Laboratory work culturing and concentrating HIV	Avoid use of sharps[1], avoid contact with skin, eyes or mouth, take special care with waste	••••
Venepuncture (puncturing the vein to draw blood or administer medication)	Wear gloves. Take care when needle is out of patient	•••
Childbirth	Cover skin wounds, wear gloves, avoid splashes to skin, eyes and mouth	•••
Placental removal	Wear long-sleeved gloves	•••
Orthopaedic surgery	Wear reinforced protective long gloves	•••
Autopsy	Wear protective long gloves for bone-cutting, avoid splashes to skin, eyes and mouth	•••
Suturing	Wear thimbles[2], use forceps	••
Cleaning used venepuncture needles	Use forceps, flush before handling	••
Waste disposal	Avoid splashes to skin, eyes and mouth, beware sharps	••
Injection	Take care with needle afterwards	•
Gynaecological examination	Wear examination gloves	•
Scalpel use	Careful technique, e.g. pass from one worker to another via a tray, take care with blade disposal	•
Mortuary work	Avoid splashes to skin, eyes and mouth	•
Dentistry	Avoid splashes to skin, eyes and mouth	•
Cleaning blood spills	Avoid splashes to skin, eyes and mouth	•
Cleaning used instruments	Disinfect before handling	•
Laundry	Avoid skin contact with wet body fluids, beware sharps	•
Examining, feeding, bathing and nursing patients, holding hands, hugging[3]	None	0
Washing up, cleaning, preparing food, making beds	None	0

Key to risk estimates

0 no risk of HIV at all, no HIV-related precautions needed
• minimal risk: exposure to infectious dose unlikely
•• moderate risk: exposure to infectious dose possible
••• significant risk: large exposures likely to involve infectious dose
•••• high risk: exposures likely to involve infectious dose

[1] A sharp is any object which can pierce the skin, including needles, scalpels, lancets, broken glass
[2] Thimbles are protective thumb or finger coverings, used for needlework
[3] When no body fluids are exposed

Table 2: Chemical disinfectants effective in inactivating HIV and hepatitis viruses

NAME	SUITABLE FOR	DO NOT USE FOR	DIRECTIONS FOR PREPARATION	DIRECTIONS FOR USE	PRECAUTIONS	COST PER LITRE
Povidone iodine (Betadine, Videne)	Handwashing and disinfecting clean surfaces	Copper or aluminium	From povidone iodine powder: a) 10% solution = 10g powder in 100ml; b) 2.5% solution = 2.5g powder in 100ml. From a 10% solution to make 2.5% solution: 1 part of 10% solution to 3 parts water, or 25ml of 10% solution and 75ml of water.	Working strength solutions, usually 25ml to a litre or as instructed by the manufacturers,10% or 2.5% solutions usually used.	Must be made up at the time of use	£3; moderately available
Chlorhexidine (Hibiscrub, Hibiclens)	Handwashing and disinfecting clean surfaces		From 5% concentrate: a) 0.5% (1:10) = 10ml of concentrate to 90ml of water; b) 0.05% solution (1:100) = 1ml of concentrate to 99ml of water.	Use as instructed by manufacturers. Often used as a 0.5% or 0.05% solution.		£2; expensive for use in large quantities; moderately available
Sodium hypochlorite (bleach, chloros, Jik, eau de Javal) Chloramine	Disinfection of cleaned equipment, gloves and surfaces	Skin	From bleach (5% available chlorine): 1:10 solution - 0.5% available chlorine = 1ml of bleach and 90 ml water. From chloramine tabs/powder (25% available chlorine): 0.5% solution = 2g chloramine in 100ml of water.	Use as a dilution giving 0.1-0.5% available chlorine (1000-5000 parts per million). Household bleach, for example, usually contains 5% available chlorine so can be diluted to 1 in 10.	Chlorine-releasing disinfectants must be diluted from stock concentrates daily. Both stock concentrates and working dilutions must be protected from heat and light. Solutions exceeding 0.1% available chlorine should not be used repeatedly on good-quality stainless steel equipment. Note also that other metals will be corroded and fabrics damaged by concentrate and strong working dilutions. Disinfection should be followed by thorough rinsing and drying. Dilutions should not be made in metallic containers as they may corrode, nor should they be made in wooden containers as the disinfectant action will be quickly neutralised.	Cost per litre of bleach: 10p; readily available Cost per litre made with chloramine tabs: 60p; difficult to obtain
Ethanol 70% Isopropyl alcohol 70% (2-propanol, surgical spirit)	Gloves, cleaned instruments such as thermometers	Large blood spillages	Used as a 70% solution; e.g. 70ml isopropyl alcohol with 30ml water.	Alcohols kill vegetative bacteria and viruses rapidly but are poor disinfectants in the presence of organic material because they do not penetrate well and because of their high evaporation rates. They can only be used effectively on surfaces which are already clean. Alcohols are flammable and must not be used near sources of ignition.	When used for the final disinfection of cleaned equipment immersion times should be at least 10 minutes.	£4-6; moderately available
Formaldehyde 4% (formal, formalin)	Surgical equipment, laboratory safety cabinets and areas	Routine use		Aldehyde disinfectants are rapid-acting, and contact times of 30 minutes are sufficient for vegetative bacteria and viruses. For bacterial spores, contact times in excess of 10 hours are needed. Aldehydes may be used as fumigants. For this to be effective a sealed chamber must be used and a high relative humidity produced along with the aldehyde vapour. This is normally achieved by boiling a mixture of aldehyde and water.	Items must be carefully washed following disinfection with these agents. Both formaldehyde and glutaraldehyde are irritants and must be handled with care. Skin, eye and respiratory contact must be avoided. Fumigation is hazardous and should only be used if there is suitable equipment to generate, contain and dispose of the aldehyde vapour. Ethylene oxide is an alternative fumigant material, but it is very dangerous and its use requires specialised equipment.	No pricing available; difficult to obtain
Hydrogen peroxide 8%	Cleaned surfaces and equipment	Copper, aluminium, zinc or brass	Concentration is often stated in volumes, e.g. 30% = 100 volumes, 6% solution = 20 volumes.	Effective disinfection for vegetative bacteria and viruses will be complete in 30 minutes.	Working solutions must be made up just before use. Concentrated solutions are very corrosive and must be handled with care.	6% solution: £2; difficult to obtain

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* WHO publications can be obtained by contacting WHO regional offices and sales agents, or by writing to: WHO, Documentation Centre, CH-1211, Geneva 27, Switzerland.

Glossary

acid-fast bacilli – when viewed through a microscope this confirms cases of tuberculosis.

autoclaving – process to sterilise using an autoclave (a device using superheated steam under pressure).

cleaning – the physical removal of most micro-organisms and contamination, using detergent and water.

disinfection – treatment to remove all infectious hazard from viruses and bacteria except that from tetanus and bacterial spores.

episiotomy – when the vaginal opening is cut to make it larger for childbirth.

false negative – when a test result shows negative but the sample is in fact infected.

hepatitis – a disease marked by inflammation of the liver.

hepatitis A – (used to be called 'infectious hepatitis') can be transmitted through the faecal-oral route, which means it can be spread through sharing cups or spoons, food preparation, shaking hands, or other normal social contact, as well as through handling faeces or other wastes.

hepatitis B – can be passed from one person to another through infected blood or body fluids, but cannot easily be caught by normal social contact or by caring for someone with the disease.

mucosa or mucus membrane – the moist layer of body tissue lining parts of the body which open to the outside, such as the lining of the mouth, eyes, nostrils, or vagina.

mandatory testing – comprehensive testing of all members of a certain population group who are given no choice in the matter.

mycobacterium tuberculosis – the micro-organism found in airborne droplets from coughs and sneezes or dust from soiled bedding, clothes or dressings which can cause tuberculosis.

prophylaxis – measures designed to prevent or protect against the spread of disease.

pulmonary tuberculosis – form of tuberculosis affecting the lungs and which accounts for 80 per cent of all tuberculosis cases.

seroconversion – when blood shows the presence of antibodies produced in response to a virus.

sharp – any object which can pierce the skin, including needles, scalpels, lancets, broken glass etc.

smear-negative – when no tuberculosis micro-organisms can be seen in a patient's sputum sample using a microscope.

smear-positive – when tuberculosis micro-organisms can be seen in a patient's sputum sample using a microscope.

sputum – matter expelled from a patient consisting of saliva and often discharges from the lungs and respiratory passage.

sterilisation – treatment to remove all infectious hazard including that from tetanus and bacterial spores.

thimble – protective thumb or finger covering, used for needlework.

tuberculosis (TB) – treatable communicable disease with most cases affecting the lungs. Symptoms may include persistent cough (sometimes containing blood), tiredness, loss of appetite, sweats and fever.

universal precautions – guidelines applicable in all health-care settings which assume that anyone may be infectious and which specify the need for barriers such as gloves and goggles to prevent contact with body fluids.

venepuncture – puncturing the vein to draw blood or administer medication.

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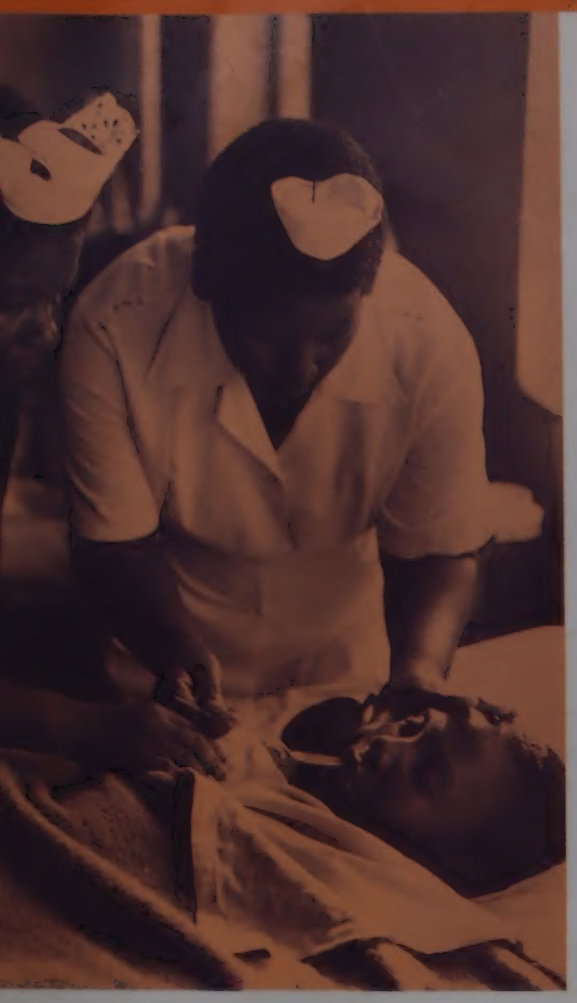

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